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Climate Change Threatens Marine Ecosystems

By Mark Spalding, ***Alaska Conservation Foundation and the Ocean Foundation***

To be sustained by the sea,
we must sustain the sea…

Despite ongoing political debates, the unavoidable reality of global climate change has been documented by leading scientists and affirmed by international consensus. We can expect the unexpected—real climate change will include changes in weather patterns, changes in ambient temperatures, changes in precipitation and rises in sea levels.

With the oceans, we need to be planning for and investing in solutions to mitigate the impact of climate change—because the impact is being felt now, and more is coming. Over half of the world's population lives along the coast, increasing the threat of economic and social disruption from rising sea levels, storm systems that are more frequent and more intense, and the loss of productive coastal ecosystems. Climate change will transform the established patterns of the relationship between the marine ecosystem and climate and its impact will be exacerbated by the damage done by overfishing, habitat destruction, coastal development, pollution and other human activity.

Funders are ideally suited to helping to ensure better collaboration and integration of efforts to address human induced climate change and those to improve the management and conservation of our oceans. And, where integration is not yet possible or underway, marine funders should consider whether their grants support enhancing the resilience of the ecosystems most at risk from climate change. While climate change is an ominous threat, "there's got to be a morning after" the "Day After Tomorrow."

Oceanographic Perspective

The ocean drives our planet's climate system. Temperature differences between the land and the ocean (which both heats and cools more slowly) create winds, and winds move air masses and their weather systems with them. Most of the precipitation that falls comes from evaporated seawater. The earth's weather and climate are the result of the redistribution of the incoming visible radiation from the sun, which is redistributed by the ocean and the atmosphere. Most of the

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incoming solar radiation is received in tropical regions and the ocean moderates seasonal and longer variations by storing and transporting large amounts of heat around the globe, via such currents as the Gulf Stream. Thus, relatively small changes in atmospheric and ocean temperatures can change the weather patterns around the globe.

The ocean is also a significant natural repository for the carbon emitted to the atmosphere by human activities. And there are proposals to accelerate the “uptake capacity” of the oceans as a means of avoiding limiting greenhouse gas emissions.

> “Because of the slow rate of mixing of the ocean, it would take many centuries for the ocean to realize most of its uptake capacity, even if anthropogenic emissions were to stop today. . . [F]uture predictions must take into account the warming of ocean waters…[and] reductions in ocean mixing (which reduce the rate at which the oceans can absorb CO2 and other gases), and changes in biology that will likely take place as a result of global warming.”[1]

System Destabilization

Global climate change introduces new instabilities into ocean systems that are already greatly disturbed and altered by over-exploitation. As a result, marine ecosystems are being simplified and becoming less stable and less productive in all climate zones.

There are nine key threats to the integrity and survival of marine ecosystems as a result of climate change. Negative consequences of this uncertain environment are already becoming apparent for marine life as illustrated in the accompanying table.

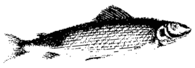
Obstacle to Ocean Conservation

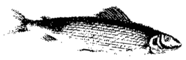
We must recognize that there is an inherent conflict between mainstream recommendations for addressing climate change and some mainstream aspects of ocean conservation. On one hand, if we fail to slow the progress of climate change, the ocean will be irreversibly harmed regardless of other conservation efforts. On the other hand, some of the clean energy recommendations may require placing structures on the sea floor, or in the water column, or in coastal habitat—solutions that the ocean conservation community views as threats to marine ecosystems and species.

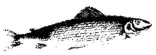
The complex intersection with the climate change issue and the promise of cleaner fuels argue for a careful, thoughtful reassessment of the “no way, no how” attitude towards coastal energy development. This is particularly true since having a positive environmental agenda with regards to energy may help leverage progress on marine protected areas, ecosystem-based planning and vital reforms to ocean governance.

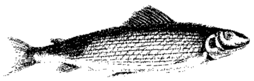
Philanthropic Opportunities

A collaborative, but diversified portfolio of grant making approaches is needed to address global change and its effects on ocean ecosystems. We should support efforts to enhance the integration of climate change in oceans conservation, so that the two realms are no longer considered separately, by funders and NGOs alike. And where integration is not readily achievable, it is still vitally important to support projects that enhance public understanding, policy level stewardship, the health, and thus the resilience of, ecosystems most at risk from climate change.





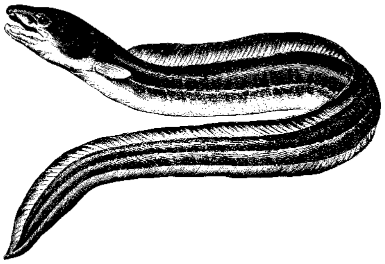




Summary of threats

Threats	Impacts
Erratic Ocean Currents (Coastal ecosystems)	Temperatures of a few degrees change can alter major currents and thus species viability in estuaries and other coastal areas—affecting all coastal plant and animal species and reducing resilience to other human impacts, such as sewage, non point source pollution, etc.)
Erratic Ocean Currents (Food Supply)	Temperature related changes have caused shortages in the food supply (krill, prey fish, phytoplankton) for whales, penguins, salmon, and marine mammals. Changes in the distribution of fish and other species could affect the global protein supply for humans as well.
Erratic Ocean Currents (Reproduction)	Endangered whales, sea turtles, and birds require specific environmental conditions for the survival of their young. Elevated nest temperatures could disrupt sea turtle recovery efforts by altering sex ratios.
Hot Water (Disease)	Outbreaks of disease in oysters, coral reefs, and other species have been on the rise with global temperatures.
Hot Water (Ice melts)	Polar bears, seals, and sea lions may be cut off from coastal hunting and nursery grounds. Krill populations, which thrive under sea ice, will decline taking with them penguins, seals and whales. Ice-free seas also absorb more sunlight energy, thus escalating warming.
Hot water (Food Supply)	Although it may be counterintuitive, the coldest waters are the most biologically rich and nutritive. Less dense warm water floats on cold water, and cold-water nutrients may become too deep to enable photosynthesis to occur. Less plankton, less fish. Less fish, less birds and marine mammals.
Hot water (Habitat damage/loss)	High temperatures cause corals to turn white and "bleach." Bleaching has become widespread, adversely affecting dive tourism, reef species, and reef system resilience. Water expands as it warms, adding to sea rise inundation of coastal areas.
High water (Habitat damage/loss)	Beaches, bluffs, and wetlands are buffeted by increasing storm damage and wave action. Sea turtle nesting beaches already threatened by development may be lost to erosion and more nests are likely to be flooded.
High Water	Saltwater intrusion into coastal marshes and river deltas—increased mortality of freshwater/brackish species and reduced productivity of estuaries. Saltwater intrusion into water tables and aquifers – loss of potable water.

SOURCES
- Intergovernmental Panel on Climate Change. 2001. Third Assessment Report.
- Intergovernmental Panel on Climate Change. 1998. Special report on the regional impacts of climate change: An assessment of vulnerability.



Some examples of philanthropic investments are as follows:

- Research and Monitoring Investments
  - Global Ocean Observing System (GOOS)
  - Polar and sea ice coverage monitoring
  - Carbon sequestration research

- Regional Investments
  - Alternative transportation thinking
  - Land use planning in coastal areas, including integrated coastal zone management techniques
  - UN Global Programme of Action on Land-Based Sources of Marine Pollution
  - Wet land and coastal protections
  - Coastal renewable energy development
  - Appliance standards

- Limit Carbon Emissions in General
  - Address marine vessels as very significant (and largely ignored) emitters of pollutants
  - Use of low carbon fuels
  - Pollution prevention
  - Energy efficiency and renewable energy (fuel cell technology investments)

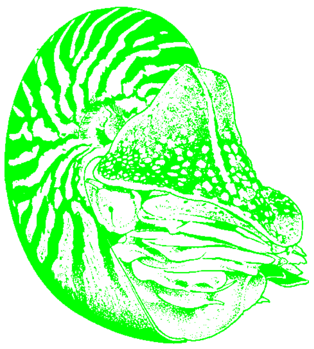
Some specific options for investments in resilience—promoting the ability of ecosystems and species to adapt to climate change or at least better withstand the adverse affects of climate change:

- Promote marine protected areas (including seasonal closures, no-take zones, and other tools) to increase survival prospects for species and habitat types
- Promote ridge to reef integrated management (e.g. White Water to Blue Water project)
- Limiting coastal habitat development (to allow ocean expansion and sea level rise)
- Environmental, economic, and equity education to increase awareness (stories we can use – e.g. disappearing polar bears, relocating Vanuatu, etc.)
- Continue to support efforts to reduce or eliminate non-climate stresses to marine life (such as dead zones, habitat destruction, contaminated runoff, sedimentation, overfishing and bycatch)

Conclusion

The ocean, which covers roughly 71 percent of Earth's surface, has the thermal inertia and heat capacity to help maintain and ameliorate climate variability. However, greenhouse gases emissions from human activities are projected to cause global climate change in excess of normal patterns, which in turn will alter coastal and marine ecosystems that are already stressed from human development, pollution, and over-fishing. We need to act now if we hope to avert far worse perturbations of the natural climate system.

We have the opportunity to ensure that the ocean continues to provide us with critical food and other services. Focusing on integrating energy and marine conservation policies, on fostering resilience, on improving our knowledge of the oceans, and on fostering the ethic of moving quickly to limit human insult to our marine neighbors gives us more than a place to start—it gives us a strategy that improves sustainability in the short-term and in the long run—and that is as much as we can ask for.



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[1] U.S. Global Change Research Program Seminar Series summary of panel on "Changes in Carbon Sources and Sinks: The Outlook for Climate Change and Managing Carbon in the Future" December 8, 1998 (available at http://www.usgcrp.gov).

MEMBER NEWS

Aditi Vaidya has joined the staff of the Jenifer Altman Foundation as their new Grants Administrator. She recently completed her Master's in Public Health at Emory University in Atlanta, where she also worked with the Center for Disease Control's Agency for Toxic Substances and Disease Registry.

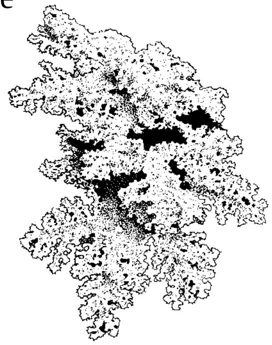
Diane Thompson has left the Pew Charitable Trusts to join FasterCures/The Center for Accelerating Medical Solutions, as their Senior Vice President for Programs. FasterCures is a new organization, combination think tank and advocacy organization, committed to finding ways to accelerate the discovery, development and availability of medical therapies.

Margaret Bowman has joined the Trusts as a program officer responsible for marine conservation programs. She has spent the last decade with American Rivers.

Michael Sutton has left the David & Lucile Packard Foundation to become Director of the Monterey Bay Aquarium's new Center for the Future of the Oceans. The Center will play a key role in marine conservation efforts by empowering individuals and influencing public policy.

After three years at the Summit Foundation, **Mariana Panuncio** has left to join the World Wildlife Fund to be the new Senior Program Officer for the Southwest Amazon World.

Eleni Sotos has left the Jenifer Altman Foundation to become the new Program Coordinator for The Collaborative on Health and the Environment (CHE).



UPCOMING EVENTS

Aug. 15-20. Balancing Ecosystem Values – Innovative Experiments in Sustainable Forestry (Portland, OR). Contact: (541) 737-2329 or http://outreach.cof.orst.edu/ecosystem.

Aug. 21-26. American Fisheries Society Annual Meeting (Madison, WI). Contact: Betsy Fritz, bfritz@fisheries.org, 301/897-8616 x212.

Aug. 25-27. Society for Ecological Restoration Annual Conference (Victoria, BC). Contact: www.ser.org.

Sep. 12-15. National Conference on Coastal and Estuarine Habitat Restoration (Seattle, WA). Contact: Nicole Maylett, nmaylett@estuaries.org or see www.estuaries.org.

Sep. 18-22. The Wildlife Society Annual Conference (Calgary, AB). Contact: www.wildlife.org.

Sep. 30 – Oct. 4. Society of American Foresters National Convention (Edmonton, AB). Contact: (301) 897-8720 or www.safnet.org/calendar.natcon.htm.

Nov. 9-11. The Good, the Bad, and the Ugly: Integrating Marine and Human Ecology in Fisheries Management (Sarasota, FL). Contact: Felicia Coleman, coleman@bio.fsu.edu or www.bio.fsu.edu/mote/current.html.

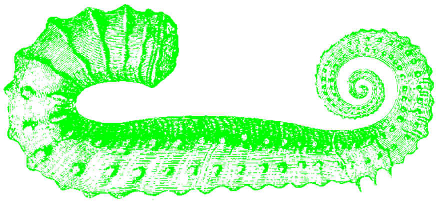
CGBD WORKING GROUPS

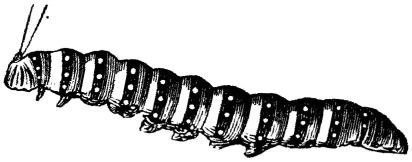
Marine Conservation

The Marine Working Group continued its series of monthly conference calls in July by addressing two interesting programs: (1) Oceans 360 and (2) a four-country effort to create a marine protection corridor.

Oceans 360 is essentially an effort to put together a "Day in the Life of the Oceans," where they will deploy over 100 photojournalists to document humankind's impact on the oceans. Products will include a traveling exhibit, a coffee table book, and a DVD. A unique twist is that they are trying to raise the necessary revenue to produce these products and sell them to aquariums, zoos, museums, and conservation groups at cost, so that they can be resold at a substantial "profit" by the organizations.

The governments of Colombia, Costa Rica, Ecuador and Panama are creating a marine corridor in the eastern Pacific to help protect endemic marine species and curtail destructive fishing activities. Environment and parks officials from the four countries say existing conservation efforts have failed to adequately protect vulnerable species and endangered ones, such as the blue whale and leatherback turtle. The project is tapping a US $3.5 million Conservation International grant to conduct biodiversity inventories, harmonize marine-protection laws and designate new Unesco World Heritage sites in the corridor. A $12 million grant for those purposes is expected from the Global Environment Facility (GEF), a fund that developed nations set up in 1992 to tackle key global environmental problems.





Climate and Energy

In the US, climate change and energy issues have often been perceived as middle-class concerns of environmentalists. In fact the impacts of climate change – and the dirty-energy economy largely driving it – fall disproportionately on poor communities and on communities of color. Among recent evidence is a report released in July by the League of United Latin American Citizens (LULAC), with the support of Clear the Air. *Air of Injustice: How Power Plant Pollution Affects the Health of Hispanics and Latinos* found that "more than 7 out of 10 Hispanic Americans are breathing air that violates federal pollution standards. Hispanic Americans face a threat 16 percent greater than the overall population."

Alongside such "impacts" work are "opportunities" efforts to build alliances within the labor and business communities focused on the job- and wealth-generating potential of a cleaner energy economy. Recent resources here include:

- a new "Why Energy Matters" guide from the Energy Future Coalition which makes the case that "American leadership and innovation in energy technologies can create a new wave of economic growth at home and protect the global environment; and
- an economic analysis commissioned and released by the Apollo Alliance suggesting that 3.3 million new jobs and much greater US energy independence could be created within ten years.

The Alliance has received support from 17 of America's largest labor unions, including the United Auto Workers, the Steelworkers and Machinists, as well as a broad cross section of the environmental movement.

Land and Freshwater Conservation

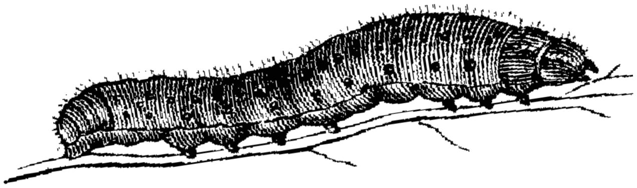
The Forest Working Group has been renamed the Land and Freshwater Conservation Working Group.

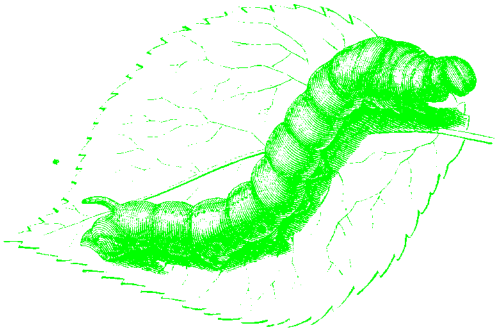
A number of smaller funder groups (and/or "campaigns") with specific interests might be staffed by the CGBD as part of the Land & Water Conservation Working Group. These issues and/or campaigns include:

- Sustainable Forestry/Certification
- Community Forestry/Conservation
- US Private Forests
- Arctic Defense Campaign
- Endangered Species Act Campaign
- Parks/Protected Areas
- Southeast Conservation (and other regional efforts)
- Freshwater Conservation

The new working group will be convening monthly conference calls and assisting in the conduct of several meetings in the coming year, including:

- an EGA Institute session on public lands at the annual EGA Retreat in Hawaii in October 2004;
- a post-election briefing in Washington, DC in December 2004 on public lands policy and management, in conjunction with the EGA Federal Policy Briefing; and
- a Spring 2005 funders briefing to take an in-depth look at public lands advocacy in the coming year, building upon the December post-election briefing but looking in greater detail at specific campaigns and collaborative opportunities.





Environmental Health

An increasingly active area of work within the field of environmental health is "translational" in nature. Built on the growing base of science about environmental exposures to toxics and the relationships between exposures and human health outcomes, translational resources aim to make this information more accessible to consumers and health-affected groups. Among recent examples:

- a web-based spreadsheet and explanatory essay from scientists participating in the Colllaborative on Health and the Environment (CHE) that summarize representative knowledge about links between environmental exposures and human diseases;
- "Skin Deep," an Environmental Working Group web database enabling consumers to learn what chemicals are in some 7,500 personal care products, as well as product rankings of known and probable associated health hazards. Skin Deep was released in conjunction with the launch of a "Because We're Worth It! The Campaign for Safe Cosmetics;" and
- a "Chemical Trespass: Pesticides in Our Bodies and Corporate Accountability" report from the Pesticide Action Network North America, which analyzed data collected by the Centers for Disease Control and Prevention and found that many US residents carry toxic pesticides in their bodies above levels deemed "acceptable" by the federal government.

THE CONSULTATIVE GROUP ON
BIOLOGICAL DIVERSITY

Presidio Building 1016
P.O. Box 29361
San Francisco, CA 94129-0361

Phone: 415/561-6575
Fax: 415/561-6490
E-mail: cgbd@cgbd.org
Web: www.cgbd.org

Lynn Lohr, Executive Director

William Hull, Program Officer

Kathy Sessions, Program Officer

Alicia Ushijima, Program Associate

Margot Bevington, Administrative Assistant

"The planet's warming up like mad, but she isn't."

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THE CONSULTATIVE GROUP ON
BIOLOGICAL DIVERSITY
Presidio Building 1016
P.O. Box 29361
San Francisco, CA 94129-0361